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<b>4. TITLE AND SUBTITLE</b> Performance Oriented Packaging Testing of Container, Shipping and Storage, Gas Generator, Mk 73 Mod 0 for Packing Group II Solid Hazardous Materials				<b>5. FUNDING NUMBERS</b>  <b>DTIC ELECTE</b> <b>S JUL 21 1992 D</b> <b>C</b>	
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<b>13. ABSTRACT (Maximum 200 words)</b>  This Performance Oriented Packaging (POP) test was conducted to ascertain whether the Mk 73 Mod 0 Gas Generator Shipping and Storage Container meets the Packing Group II requirements specified by the United Nations Recommendation on the Transportation of Dangerous Goods Document, ST/SG/AC.10/1, Revision 6, Chapters 4 and 9 and the Code of Federal Regulations, Title 49 CFR, Parts 107 through 178, dated 1 October 1991. The container's contents consisted of a simulated load weighing 2.41 kg (5.31 pounds). Gross weight of the loaded container was 2.95 kg (6.5 pounds). The test results indicate that the container has conformed to the POP requirements.					
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**PERFORMANCE ORIENTED PACKAGING TESTING  
OF  
CONTAINER, SHIPPING AND STORAGE,  
GAS GENERATOR, MK 73 MOD 0  
FOR PACKING GROUP II SOLID HAZARDOUS MATERIALS**

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July 1992

**FINAL**

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## **INTRODUCTION**

This Performance Oriented Packaging (POP) test was performed to ascertain whether the Mk 73 Mod 0 Gas Generator Shipping and Storage Container (Packing Group II) meets the requirements specified by the United Nations Recommendation on the Transportation of Dangerous Goods Document, ST/SG/AC.10/1, Revision 6, Chapters 4 and 9 and the Code of Federal Regulations, Title 49 CFR, Parts 107 through 178, dated 1 October 1991. The container's contents consisted of a simulated load weighing 2.41 kg (5.31 pounds). Gross weight of the loaded container was 2.95 kg (6.5 pounds). The containers were identified as #1 through #6.

## **TESTS PERFORMED**

### **1. Base Level Vibration Test**

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.608. Containers #1, #2, and #3 were placed on a repetitive shock platform which has a vertical linear motion of 1-inch double amplitude. Movement of the containers was restricted during vibration in all but the vertical direction. The frequency of the platform was increased until the containers left the platform 1/16 of an inch at some instant during each cycle. Test time was 1 hour.

### **2. Stacking Test**

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.606. Containers #4, #5, and #6 were used for this test. Each container was subjected to a force applied to its top surface equivalent to the total weight of identical packages stacked to a minimum height of 3 meters (including the test container). A weight of 39.6 kg (80 pounds) was stacked on each test container. The test was performed for 24 hours. The weight was then removed and the containers examined.

### **3. Drop Test**

This test was performed in accordance with Title 49 CFR, Part 178, Subpart M, Sec. 178.603. Six drops were performed from a height of 1.2 meters (4 feet) in the following orientations (three drops for each orientation):

- a. Horizontally using container #1, #2, and #3.
- b. Diagonally on the edge between the cover assembly and the top ring of the container using container #4, #5, and #6.

## **PASS/FAIL**

### **1. Base Level Vibration Test**

The criteria for passing the base level vibration test is outlined in Title 49 CFR, Sec. 178.608(c): No test sample should show any deterioration which could adversely affect transportation safety or any distortion liable to reduce packaging strength.

### **2. Stacking Test**

The criteria for passing the stacking test is outlined in Title 49 CFR, Sec. 178.606(d): No test sample may show any deterioration which could adversely affect transportation safety or any distortion likely to reduce its strength, cause instability in stacks of packages, or cause damage to inner packagings likely to reduce safety in transportation.

### **3. Drop Test**

The criteria for passing the drop test is outlined in Title 49 CFR, Sec. 178.603(f): A package is considered to successfully pass the drop tests if for each sample tested, no rupture occurs which would permit spillage of loose explosive substances or articles from the outer packaging.

## **TEST RESULTS**

### **1. Base Level Vibration Test**

Satisfactory.

### **2. Stacking Test**

Satisfactory.

### **3. Drop Test**

Satisfactory.

## **DISCUSSION**

### **1. Base Level Vibration Test**

The input vibration frequency was 3.6 Hz. Immediately after the vibration test was completed, each container was removed from the platform, turned on its side and inspected. No unfavorable distortion or deterioration was observed.

**2. Stacking Test**

Each container was inspected after the 24-hour period was over. No unfavorable distortion or deterioration was observed.

**3. Drop Test**

After each drop, the containers were inspected. The contents were completely retained by the container.

**REFERENCE MATERIAL**

A. United Nation's "Recommendation on the Transportation of Dangerous Goods," ST/SG/AC.10/1, Revision 6.

B. Code of Federal Regulations, Title 49 CFR, Parts 107-178.

C. Bureau of Explosives Tariff No. BOE 6000K Hazardous Materials Regulations of the Department of Transportation by Air, Rail, Highway, Water including Specifications for Shipping Containers.

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Naval Surface Warfare Center  
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## TEST DATA SHEET

<b>DATA SHEET:</b>	
Container: Mk 73 Mod 0 Gas Generator Shipping and Storage Container	
Type: 1A2	Container P/N or NSN: 8110-00-254-5719
Specification Number: 6375372	Material: Steel
Gross Weight: 2.95 kg (6.5 pounds)	Dimensions: 9" H x 5-1/2" W
Closure (Method/Type): Cover and Locking Ring	Tare Weight: 0.54 kg (1.19 pounds)
Additional Description:	
<b>PRODUCT:</b>	
Name: See table	NSN(s): See table
United Nations Number: See table	
United Nations Packing Group: II	
Physical State (Solid, Liquid, or Gas): Solid	
Vapor Pressure (Liquids Only): N/A      At 50 °C: N/A      At 55 °C: N/A	
Consistency/Viscosity: N/A	Density/Specific Gravity: N/A
Amount Per Container:	Flash Point: N/A
Net Weight: See table	
<b>TEST PRODUCT:</b>	
Name: Lead Weights	Physical State: Solid
Consistency: N/A	Density/Specific Gravity: N/A
Test Pressure (Liquids Only): N/A	
Amount Per Container: N/A	Net Weight: 2.41 kg (5.31 pounds)
Additional Description:	
The net weight includes the maximum net product weight plus an additional 0.59 kg (1.31 pounds).	

**TABLE 1**  
**Products Approved for Shipping in the**  
**Mk 73 Mod 0 Gas Generator Shipping and Storage Container**

NALC/ DODIC	NSN	Product Nomenclature	Packing Drawing Number	Haz Class/Div	UN Number	Units/ Cntr	Total Net Weight (lb)	Total Gross Weight (lb)
TBD	6T-1351-01-286-8066	Mk 73 Mod 0 Gas Generator	DL 6375372	TBD	TBD	1	4	5.19

TBD = To Be Determined

**MK 73 MOD 0 GAS GENERATOR  
SHIPPING AND STORAGE CONTAINER  
POP MARKING**

**UN 1A2/Y3/S/\*\*/USA/DOD/NAD**

**\*\* YEAR LAST PACKED OR MANUFACTURED**